
2

Observations on the Distribution and Ecology of Barker's Anole, *Anolis barkeri* Schmidt (Iguanidae)

J. P. KENNEDY

Department of Anatomy, The University of Texas
Dental Branch, Houston, Texas 77025

(Plate I)

RECENTLY Robinson (1962) reported on a population of *Anolis barkeri* living on the western slopes of Volcán Santa Marta in the region of "Los Tuxtlas," Veracruz, Mexico, at longitude 94°25', latitude 18°25'. This is apparently the first account of a population of this anole since the species was described from a single specimen by the late Karl P. Schmidt in 1939. Smith & Taylor (1950) recorded *Anolis barkeri* only from the type locality of Cascajal, upper Uzpanapa River, Veracruz. During a recent stay in Catemaco, Veracruz, in the Tuxtlas, I journeyed to Volcán Santa Marta for the purpose of making observations on the ecology of this poorly known, semi-aquatic anole, and those observations are reported here.

DISTRIBUTION

Two specimens of *A. barkeri* were collected in a preliminary visit to Volcán Santa Marta on June 8, and the days and nights of June 22 and 23, 1964, were spent in collecting at this locality. Four anoles were collected on June 22 and one on the morning of June 23. Two were misplaced in transit and one disintegrated in an experimental fixative. Of the remaining four specimens, three have been placed in the collection of Arlington State College Vertebrate Museum and one was sent to Dr. Carmona y Valle of the Instituto Nacional de Investigaciones Biológico-Pesqueras, Mexico, D.F., in accordance with the collecting permit issued by the Mexican government.

In addition to the specimens cited by Robinson (1962), at least 12 specimens of *Anolis barkeri* are known that represent additional localities in southern Mexico. Noteworthy are those that extend the range into the state of Oaxaca. Because

these specimens add considerably to the previous distributional records they are listed here.

Veracruz. University of Illinois Museum of Natural History Collection No. 40141, Coyame, about 10 miles east of Catemaco, Veracruz. The Museum of Natural History of Kansas Nos. 27503-4, 20 kilometers east northeast of Jesus Carranza.

Oaxaca. University of Illinois Natural History Collection Nos. 35517-9, 35521-2, from Cerro Azul, above La Gloria. Museum of Comparative Zoology No. 58221 from Cerro Azul. American Museum of Natural History No. 64986, Santa Maria Chimalapa; Nos. 64985, 64987, Rio Grande at an altitude of 1,300 feet.

The American Museum specimens were collected along streams. A delimitation of the range of *A. barkeri* at this time is certainly premature but the limited ecological observations which follow suggest a habitat preference for stream margins which provide favorable temperatures and boulders for basking. It would not seem unreasonable to expect the species to occur along similar aquatic habitats in this region of southern Mexico.

ECOLOGICAL OBSERVATIONS

Extensive banana plantations occur in the region of Santa Marta but most of the area that has not been cleared supports a dense rainforest. Numerous springs on the upper western slope of Volcán Santa Marta give rise to many small streams that course down through the rainforest to enter a swiftly flowing river. A Kollsman Type C-12 altimeter measured an altitude of approximately 1,250 feet at the campsite atop a steep-cut bank about 25 feet above the river. Some of the seepages of the western slope form

only trickles that are covered by ferns and thick vegetation of the forest floor. Other wider streams are several inches deep and have small waterfalls along their course. In the more open areas through which these wider streams traverse, sunlight penetrates the forest canopy and warms the exposed boulders that rest in the stream beds. *Anolis barkeri* basks on these boulders, usually in close proximity to the water. It was also observed basking on the boulders along the periphery of the river where the swift current is much reduced. One anole was sighted clinging to a small limb overhanging the water.

June 22 was a bright, sunny day. Basking anoles were sighted by slowly walking wherever possible in the beds of the streams and river. My attention was usually attracted when the lizards sought concealment. Escape behavior consisted essentially of darting into the water or into a crevice beneath a boulder. Those that darted into the water were usually located in concavities beneath the boulders. Some were found resting in the shallow water that trickles through these crevices; others were observed clinging to the underside of the boulders about an inch or so above the water. The brown body coloration blends well with the volcanic boulders, especially when the lizards are wet, and in poorly lighted situations they were not easily seen. Their mild temperament is indicated by the fact that none offered to bite when first seized and would only bite after some provocation. A nematode was observed protruding from the mouth of one immediately after capture. It was a mermithid and it is probable that the anole had just eaten a grasshopper or similar host in which mermithid nematodes are normally parasitic. Orthopteran remains were found in the stomach of one anole. Information on the nematode was supplied by Mrs. M. B. Chitwood through the kindness of Dr. Libbie H. Hyman.

In an attempt to obtain information on the thermal ecology of this anole, temperatures were measured with a quick-reading Schultheis thermometer. Body temperatures were measured by inserting the bulb of the thermometer into the cloaca as soon as possible after capture. Air temperatures were measured by holding the ther-

mometer about a centimeter above the lizard's initial resting site. Water temperatures were measured by holding the thermometer about a centimeter beneath the surface. Even though the environmental temperatures recorded by this method are crude approximations, they show close agreement with the lizard's body temperature (Table I). Mean body temperature exceeded the mean air temperature of the resting site by 1.2°C and the mean water temperature by 2.1°C. Conduction from the surface of the boulders is probably an important source of body heat. No anoles were seen resting on these boulders during one of the heavy afternoon rains on Volcán Santa Marta.

Photographs of live *Anolis barkeri* are published for the first time in Plate I, A, B. The largest *A. barkeri* that I collected is a male with a snout-vent length of 98 mm., 172 mm. tail, and weight of 17.3 grams. Four males have a mean snout-vent length of 86 mm. (80-98 mm. range) and a mean weight of 12.2 grams (9.1-17.3 grams). Three females have a mean snout-vent length of 69 mm. (61-79 mm. range). Snout-vent length and corresponding weight of two of the females are 79 mm., 10.2 grams; 61 mm., 5.2 grams.

A 79 mm. snout-vent-length female laid two eggs on July 7 in the jar in which she was temporarily restrained. Her weight prior to laying was 10.2 grams, as compared to 7.5 grams after oviposition. Dissection of this female revealed that one of the ovaries contained a well-developed ovum. It is possible that the two ovaries alternate in egg production, with multiple clutches per female each year. Such an ovarian cycle has been demonstrated by Hamlett (1952), who showed that in female *Anolis carolinensis* living near New Orleans the ovaries alternate quite regularly in continuous and rhythmic egg production. Egg laying covers a period of four or five months, with each female laying an egg every two weeks. The reproductive potential, ovarian cycle and period of egg laying for *A. barkeri* are completely unknown and probably differ considerably from those of the smaller, non-aquatic *A. carolinensis*.

TABLE I. CLOACAL AND ENVIRONMENTAL TEMPERATURES OF *Anolis barkeri*.

Number	Snout-vent Length Mean (Range) mm.	Cloacal Temperature Mean (Range) °C	Air Temperature Mean (Range) °C	Water Temperature Mean (Range) °C
7*	78.7 (61-98)	24.4 (22.0-26.8)	23.2 (22.2-24.2)	22.3 (21.6-24.2)

*Two of the seven anoles were being splashed by water when initially sighted and no air temperature is listed.

The eggs of *A. barkeri* are light cream-colored ellipsoids (Plate I, C). Measurements of the two eggs are: 17.0×9.7 mm., 1.1 grams; 17.2×9.5 mm., 1.0 grams. A 67 mm. snout-vent-length female contained an oviducal egg that measured 13×9 mm. and an ovarian egg of approximately 7 mm. in greatest diameter. The only other measurement of eggs of *A. barkeri* is that of a preserved uterine egg which measured 17.3×9.2 mm. and was covered with fibrous striations (Robinson, 1962). The two eggs laid by the captive anole above were smooth in appearance upon gross inspection. The manner in which the eggs are deposited and the nesting site in nature are unknown. Adaptations for incubation in the moist humid environment of the rainforest are to be expected.

ACKNOWLEDGMENTS

I am deeply indebted to Dr. William F. Pyburn and Mr. William E. Turner of Arlington State College for much assistance in the field and especially to Dr. Pyburn for driving me from Playa Azul on Lake Catemaco to Volcán Santa Marta. Dr. Hobart M. Smith generously supplied me with locality data for additional museum specimens of *A. barkeri*. Miss June Moreland greatly assisted in the preparation for my studies in Veracruz, which were supported by a grant (GU-482-A) from the National Science Foundation to The University of Texas Dental Branch.

SUMMARY

Limited observations on the ecology and behavior of *Anolis barkeri* Schmidt were made in a rainforest in southern Veracruz, Mexico. *Anolis barkeri* is a semi-aquatic anole showing a habitat preference for stream margins which provide favorable temperatures and boulders for basking. A mean cloacal temperature of 24.4°C was recorded for 7 anoles. Photographs of live *A. barkeri* and eggs of the species are published for the first time. Locality records of additional specimens in museums extend the range into southern Oaxaca.

LITERATURE CITED

- HAMLETT, GEORGE W. D.
1952. Notes on breeding and reproduction in the lizard *Anolis carolinensis*. *Copeia*, 1952 (3): 183-185.
- ROBINSON, DOUGLAS C.
1962. Notes on the lizard *Anolis barkeri* Schmidt. *Copeia*, 1962 (3): 640-642.
- SCHMIDT, KARL P.
1939. A new lizard from Mexico with a note on the genus *Norops*. *Zool. Ser. Field Mus. Nat. Hist.*, 24 (2): 7-10.
- SMITH, HOBART M., & EDWARD H. TAYLOR
1950. An annotated checklist and key to the reptiles of Mexico exclusive of the snakes. *Bull. U. S. Nat. Mus.* No. 199: 1-253.

EXPLANATION OF THE PLATE

PLATE I

Lateral view of *Anolis barkeri* Schmidt. **A.** Female 79 mm. snout-vent, 98 mm. tail, 10.2 grams. **B.** Male 85 mm. snout-vent, 87 mm. tail (incomplete), 12.2 grams. **C.** Two eggs laid by the above female.